JUTLP
Journal of University Teaching & Learning Practice

Teaching with Generative Artificial Intelligence: Enhancing Critical Thinking and Ethical Awareness in Academic Writing

Hanane Benali Taouis[a], Almudena Díaz García[a]
[a] Universidad Politécnica de Madrid, España

Abstract

This article explores the integration of artificial intelligence (AI), ChatGPT and Writefull for Word, in an English course for Academic and Professional Communication, situated within the broader context of digital transformation in higher education and the evolving demands of academic integrity. The study adopts a critical digital pedagogy approach to foster students' awareness of ethical engagement with AI tools, drawing on self-regulated learning and Bloom's revised taxonomy to guide cognitive development and autonomous academic practices. The suggested activities were purposefully aligned with Bloom's revised taxonomy to support the progressive development of higher-order thinking skills. They were designed to encourage reflective practices, promote critical analysis of AI-generated content, and establish clear guidelines for responsible and ethical use. The analysis of 24 reports from 96 Spanish undergraduate students across four degree programmes suggests that the process of verifying and adapting AI-generated content strengthened the students' critical thinking and assessment skills, while the integration of AI into the writing process also fostered a deeper awareness of course content and research practices.

Editors

Section: Special Issues
Editor-in-Chief: Dr Joseph Crawford
Senior Editor: Dr Cassandra Colvin

Publication

Submission: 17 April 2025
Revised: 4 December 2025
Accepted: 3 March 2026
Online First: 4 May 2026

Copyright © by the authors, in its year of first publication. This publication is an open access publication under the Creative Commons Attribution CC BY-ND 4.0 license.

Practitioner Notes

1. Educators should harness AI to foster critical thinking rather than treat it as a shortcut for writing tasks.
2. Designing AI-supported activities around Bloom's taxonomy builds cognitive progression from recall to creation.
3. Integrating self-regulated learning strategies ensures students develop autonomy and responsibility when using AI**.**
4. Structured use of ChatGPT in drafting research proposals teaches students to question outputs, detect hallucinations, and validate sources.
5. Writefull can be used as a linguistic coach, improving grammar and academic tone while preserving student authorship and critical thinking.

Keywords

Artificial intelligence, language teaching, critical thinking, writing.

Citation: Benali Taouis, H. & Díaz García, A. (2026). Teaching with AI: Enhancing Critical Thinking and Ethical Awareness in Academic Writing. *Journal of University Teaching and Learning Practice, 23*(5). https://doi.org/10.53761/28y4hw95

Introduction

The integration of artificial intelligence (AI) into academic courses is rapidly transforming the landscape of higher education, reshaping pedagogical approaches and redefining traditional notions of authorship, originality, and learning. As AI tools become increasingly accessible and powerful, educators are faced with both opportunities and challenges in adapting their teaching practices to meet this evolving technological environment. In the context of professional and academic writing, this article explores the pedagogical potential of generative AI to enhance critical thinking, foster active student engagement, and encourage self-reflection, while also addressing the ethical and practical considerations of its use in the classroom. A central learning and teaching challenge in this context is how instructors can integrate generative AI into academic writing courses to enhance students' critical thinking and engagement while maintaining academic integrity and meaningful learning.

Rather than adopting a restrictive stance that prohibits the use of AI tools, our approach emphasises guided, intentional integration, encouraging students to engage with AI-generated content ethically and critically. This pedagogical orientation supports the development of digital literacy skills, enabling students to understand not only how AI tools work but also how to use them responsibly in academic and professional contexts. This approach recognises that AI is not a threat to education but a transformative force that, if used thoughtfully, can deepen students' understanding of writing practices and support more inclusive and personalised learning experiences.

This perspective is consistent with the principles of critical digital pedagogy (CDP), a framework that promotes ethical, reflective, and socially aware engagement with educational technologies. CDP is grounded in the work of Freire (1970), whose emancipatory vision of education underscores the importance of empowering learners to question dominant narratives, engage in dialogue, and make informed decisions. In the digital era, CDP calls for a critical awareness of the social, cultural, and political dimensions of technological tools, urging educators to move beyond surface-level adoption toward practices that cultivate critical consciousness (Nduna & Ncube, 2025).

In the context of AI, CDP encourages educators and students alike to examine the biases embedded within algorithms, the potential for misinformation, and the broader implications of outsourcing cognitive tasks to machines. It also invites a rethinking of assessment practices, academic integrity policies, and the very role of educators as facilitators of knowledge rather than sole sources of authority (Perkins et al., 2023). By integrating AI in a structured and reflective manner, instructors can help students navigate these complexities, fostering a classroom culture that values transparency, responsibility, and collaborative learning.

Furthermore, institutional adoption of AI tools requires reevaluating curriculum design, faculty training, and support systems to ensure that educators and students are adequately prepared to engage with these technologies. As Light et al. (2024) argue, CDP not only equips students to confront the ethical challenges posed by digital technologies but also helps them cultivate a reflective and critical attitude toward AI tools. In this way, CDP provides a powerful lens through which to navigate the promises and perils of AI, ensuring that technological innovation is guided

by pedagogical integrity and a commitment to inclusive ethical education (García-López & Trujillo-Liñán, 2025).

To support a more interactive approach that aligns with the paper's objective of fostering critical thinking, this study draws on CDP, self-regulated learning (SRL), and Bloom's revised taxonomy. While CDP emphasises ethical and reflective engagement with AI, SRL provides a framework for understanding how learners set goals, monitor progress, and engage with tools and their learning environment (Zimmerman, 2002). Complementing these perspectives, Bloom's revised taxonomy (Anderson & Krathwohl, 2001) outlines a hierarchy of cognitive skills from lower-order processes, such as remembering and understanding, to higher-order thinking, such as analysing, evaluating, and creating. This taxonomy serves as a guide to designing AI-supported activities that gradually build cognitive complexity and academic independence. By integrating these theories, we explore how AI tools can be used in dynamic, student-centred activities, such as self-assessments and real-time feedback, to promote learners' autonomy and strengthen critical thinking skills (Leontyev, 1978). This study is therefore theoretically grounded in critical digital pedagogy, self-regulated learning, and Bloom's revised taxonomy, which together guide the design of the AI-supported writing activities and provide a framework for interpreting students' engagement with AI tools in academic writing.

Building on this theoretical foundation, it is essential to situate critical thinking within the broader context of higher education, where it equips students to navigate complex social challenges and make informed decisions. Critical thinking is closely connected to CDP and SRL, as it involves not only evaluating information but also developing reflective and higher-order thinking skills. These higher-order skills (HOTS), including analysis, synthesis, evaluation, and creativity, are central to problem-solving and innovation. To cultivate them, educators are increasingly adopting innovative approaches such as problem-based and collaborative learning, which have been shown to improve both critical thinking and academic outcomes (Bhuttah et al., 2024). In contrast, traditional methods may fall short in promoting students' critical engagement (Leibovitch et al., 2025).

Within this pedagogical shift, the integration of AI tools into the classroom offers a promising opportunity to further enhance reflective and critical thinking. When applied thoughtfully, AI can support both innovative and traditional teaching methods by enabling personalised learning experiences and providing real-time feedback that encourages deeper engagement with content (Holmes et al., 2017). Furthermore, AI technologies are advancing toward greater adaptability and efficiency in education (Chen et al., 2021), making them valuable assets when embedded within frameworks that prioritise critical engagement and uphold academic integrity.

This paper presents an approach to integrating AI into professional and academic writing. Its main objective is to explore AI-supported writing activities designed to enhance students' critical thinking, self-reflection, and academic writing skills while ensuring the ethical and responsible use of these tools. The proposed activities reflect a commitment to fostering a learning environment in which AI functions as a tool for intellectual development rather than as a substitute for original thinking. Through this approach, the paper illustrates how AI tools can be integrated into a student-centred learning environment that supports the development of the skills required for

academic and professional writing in an increasingly digital world. In line with these objectives, this study addresses the following research question:

> **Research Question:** How can AI tools be integrated into academic writing instruction to enhance students' critical thinking, self-reflection, and ethical awareness?

The remainder of this paper is organised as follows. First, the theoretical framework introduces the key concepts that underpin the study, including critical digital pedagogy, self-regulated learning, and Bloom's revised taxonomy. Next, the methodology section outlines the educational context and the design of the AI-supported activities implemented in the course. The following sections present and discuss the results, highlighting how students engaged with AI tools in the writing process and how this engagement contributed to critical thinking, responsible AI use, and active participation in academic writing. Finally, the paper concludes by reflecting on the outcomes of this approach and its relevance for teaching and learning practices in higher education.

This study contributes to current discussions on the integration of AI in higher education by offering a pedagogical approach that emphasises guided, ethical, and reflective use of AI tools in academic writing. Its significance lies in demonstrating how AI can be incorporated into teaching practices to support critical thinking, digital literacy, and student autonomy. The findings may inform educators designing AI-supported learning activities and institutions developing policies and strategies for the responsible use of AI in education. In this way, the study highlights the potential of AI to enhance teaching and learning when integrated into pedagogical frameworks that prioritise critical engagement and ethical awareness.

Literature

AI tools become increasingly embedded in higher education, their role extends beyond automation and efficiency to encompass cognitive, metacognitive, and ethical dimensions of student learning. To address these interconnected domains, this study draws on Bloom's revised taxonomy, SRL, and CDP as complementary theoretical perspectives. Bloom's taxonomy provides a cognitive model that progresses from recall and comprehension to higher-order analysis, evaluation, and creation. SRL extends this framework by emphasising learners' capacity to set goals, monitor progress, and critically evaluate feedback, thereby aligning metacognitive strategies with cognitive development. CDP situates these processes within broader ethical and socio-political contexts, underscoring issues of authorship, bias, and responsibility in the use of AI. Together, these perspectives frame AI not merely as a technological tool but as a pedagogical resource that can encourage cognitive growth, cultivate metacognitive autonomy, and promote ethically responsible academic practice.

Bloom's Revised Taxonomy and AI-Assisted Learning

Bloom's revised taxonomy (Anderson & Krathwohl, 2001) offers a hierarchical framework for cognitive development, progressing from remembering and understanding to applying, analysing, evaluating, and creating. This framework provides a valuable perspective for designing AI-

assisted learning activities, enabling instructors to align pedagogical goals with the material's cognitive complexity. At the lower levels, students may use tools such as *ChatGPT* or *Writefull* to recall grammatical rules (remembering) or paraphrase academic content (understanding). At intermediate levels, AI-generated feedback can guide revision and adaptation to academic conventions (applying). Higher-order thinking emerges when students interrogate AI outputs for biases (analysing), evaluate the credibility of suggestions (evaluating), and synthesise insights into original academic work (creating). This progression highlights the shift from passive reception to active, reflective engagement, showing that AI's value depends on how learners critically assess and transform outputs rather than simply consuming them.

Beyond cognitive growth, Bloom's taxonomy supports co-construction of knowledge through reflection and guided interaction. By acknowledging AI's limitations, including hallucinations, oversimplifications, and cultural bias, educators can cultivate epistemic humility and critical awareness. Students learn to question both AI-generated content and the assumptions behind its design, strengthening higher-order thinking and reinforcing academic integrity. In this sense, Bloom's framework positions AI as a pedagogical facilitator that promotes cognitive autonomy, metacognitive depth, and responsible engagement in academic writing. This integrated approach emphasises that the educational benefits of AI emerge not from the technology itself but from intentional pedagogical design that connects cognitive development, reflection, and ethical awareness.

Self-Regulated Learning and Strategic AI Use

Self-regulated learning (SRL) provides an essential foundation for this study as it emphasises learners' responsibility for goal-setting, progress monitoring, and reflective evaluation (Zimmerman, 2002). Defined by Pintrich (2000) as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment" (p. 453), SRL highlights the strategies students use to initiate, sustain, and achieve learning goals while managing necessary resources (Zimmerman & Schunk, 2011). Central to SRL is metacognition, or the ability to regulate one's own cognitive processes, a skill of increasing importance in higher education, where students must navigate complex interdisciplinary tasks with autonomy. In this context, SRL fosters academic independence and complements the study's ethical dimension by equipping learners to critically evaluate the appropriateness of AI assistance and reflect on its implications.

These principles are operationalised in AI-assisted writing tasks through tools such as *ChatGPT* and *Writefull*, which provide immediate, responsive feedback to support revision and reflection. Embedding such reflective practices enables educators to guide students from a dependent reliance on AI toward a strategic, intentional use, thereby fostering both academic maturity and learner autonomy. A major challenge, however, lies in the risk of students over-relying on AI feedback at the expense of independent judgment. To mitigate this, instructors can design reflective assignments that require students to justify the acceptance or rejection of AI suggestions, reinforcing self-regulation and the cultivation of critical academic agency.

Critical Digital Pedagogy and Ethical Awareness in AI-Assisted Writing

While AI technologies have the potential to enhance both cognitive and metacognitive learning processes, they also raise pressing ethical challenges that must be addressed critically. Drawing on the principles of CDP, rooted in Freirean thought (Freire, 1970), this study emphasises the need to interrogate the social, political, and epistemological dimensions of technology use in educational contexts. Critical pedagogy is an educational philosophy that encourages learners to analyse and challenge prevailing social norms, power structures, and dominant practices (Freire, 1970; Gonye & Moyo, 2023). It focuses on fostering critical awareness through an ongoing process of reflection and action, enabling students to recognise and confront social, political, and economic inequalities. This approach contrasts with conventional education, which often emphasises memorisation and passive reception of knowledge, by prioritising dialogue, engagement, and transformative learning (Valls-Carol et al., 2022). Expanding on these ideas, CDP examines how digital technologies influence learning experiences, access to information, and power relations within educational settings. Within the scope of AI-assisted writing, these concerns include algorithmic bias, misinformation, authorship ambiguity, and data privacy (Selwyn, 2019).

Educators play a central role in fostering not only students' technical proficiency in using AI tools but also their ethical and transparent use of AI tools. Promoting ethical awareness requires cultivating an open classroom dialogue about academic integrity, intellectual ownership, and the broader implications of outsourcing cognitive labour to machines. In this context, co-constructed classroom norms can serve to establish a culture of shared responsibility in digital learning environments. Special attention should be paid to lower-order cognitive tasks, such as generating ideas or summarising content, which may involve minimal ethical risk, and to the uncritical delegation of higher-order processes, such as argument construction or original synthesis (creating), that can compromise academic integrity if not properly attributed. Encouraging students to critically reflect on these boundaries enhances ethical reasoning and reinforces principles of self-regulated learning.

Together, the three theoretical perspectives, Bloom's revised taxonomy, CDP, and SRL, underscore that the educational value of AI does not reside in the technology itself, but in the pedagogical intentionality with which it is implemented. When AI is embedded within cognitive, metacognitive, and ethical frameworks, it can serve as a powerful catalyst for deeper learning, critical thinking, and responsible academic engagement. Consequently, this study investigates how higher education courses can integrate AI to promote the development of reflective, self-regulated, and ethically aware academic writers. However, to ensure these tools are used responsibly, educators must guide students through reflective practices, actively address the potential risks of over-reliance, and foster ethical literacy in the digital age (European University Association, 2023; UNESCO, 2023). In this study, these theoretical perspectives inform both the pedagogical design of the intervention and the analytical lens through which students' reflective reports are examined.

Method

This study was conducted within the framework of the English for Professional and Academic Communication (EPAC) course, offered to undergraduate students enrolled in computing-related degree programmes at the Universidad Politécnica de Madrid (UPM), Escuela Técnica Superior de Ingenieros Informáticos. The course aims to enhance students' written and oral communication skills in academic and professional contexts. It is structured around three interconnected units: the pentachart, the research proposal (RP), and the RP's oral presentation (OP). All three units are linked to a technical challenge posed at the beginning of the course, which students are required to address from the perspective of their discipline as future computer engineers. The structure of the course supports the progressive development of genre awareness, academic literacy, and communicative competence.

Design

The activities presented in this study are located in the second unit of the course, which focuses on developing the research proposal (RP). This stage of the course was implemented over a four-week period during the academic year. During this time, instruction focused on the structural components of a research proposal and on essential principles of academic writing, including paragraph structure, clarity, coherence, cohesion, citation, and critical engagement with sources. The instructional design integrated a genre-based, task-oriented approach, guiding students through a process of progressive drafting and revision. The design of the intervention was explicitly informed by the study's theoretical framework. Critical digital pedagogy guided the emphasis on ethical reflection and critical evaluation of AI-generated content, self-regulated learning informed the inclusion of reflective tasks and iterative revision processes, and Bloom's revised taxonomy shaped the progression of activities from foundational understanding to higher-order analysis and evaluation.

To support a more interactive approach that aligns with the paper's objective of fostering critical thinking, the instructional design draws on critical digital pedagogy (CDP), self-regulated learning (SRL), and Bloom's revised taxonomy. While CDP emphasises ethical and reflective engagement with AI, SRL provides a framework for understanding how learners set goals, monitor progress, and engage with tools and their learning environment (Zimmerman, 2002). Complementing these perspectives, Bloom's revised taxonomy (Anderson & Krathwohl, 2001) outlines a hierarchy of cognitive skills from lower-order processes, such as remembering and understanding, to higher-order thinking, such as analysing, evaluating, and creating. This taxonomy serves as a guide to designing AI-supported activities that gradually build cognitive complexity and academic independence.

Participants

The participants are 96 Spanish undergraduate students in their final year of undergraduate studies. They were enrolled in four-degree programmes: Computer Engineering, Mathematics and Computer Science, Data Science and Artificial Intelligence, and a double degree in Computer Engineering and Business Administration (2024-2025 academic year). Students were instructed to self-organise into groups of four, resulting in 24 project groups. Group formation was voluntary

and not limited by academic programme, thus encouraging interdisciplinary collaboration among students from diverse technical backgrounds. The study involved standard classroom activities with minimal risk, voluntary and anonymous participation, and no collection of sensitive data. Prior to participation, the study received ethical approval from the institution, and all students provided informed consent in accordance with university guidelines. Although the study is situated within a computing-focused academic context at a single Spanish institution, the methodology, particularly the integration of generative AI tools and self-regulated learning strategies, can be adapted to other disciplinary or institutional settings by aligning the proposed tasks with genre conventions, writing standards, and ethical concerns relevant to these academic domains.

Measures

Multiple data sources were collected to examine students' engagement with AI-supported writing activities and their development of academic writing and critical thinking skills. These included AI-generated drafts of research proposal sections, student revisions of these drafts, screenshots documenting interactions with AI tools, students' analytical reflection reports, and the final submitted versions of the research proposal sections. These materials provided evidence of students' writing processes, their interaction with AI-generated content, and their application of academic writing principles.

Teaching intervention

The activities designed for this research introduce a combination of generative AI (*ChatGPT*) and AI-powered writing assistants (*Writefull*) as tools for drafting, analysing, and refining academic writing. By engaging in AI-generated content, students learn to assess language structures, adapt content to academic conventions, and enhance their writing. These activities support the course objectives by emphasising responsible AI use and reinforcing the fundamental principles of academic integrity and critical thinking. The integration of CDP is central here, as it empowers students to critically engage with AI tools, not just as passive users but also as active agents shaping their writing process. This critical engagement ensures students reflect on the ethical implications of AI-generated content and maintain academic integrity.

The version of *ChatGPT* used was *GPT-4*, accessed through the *ChatGPT* platform, to generate content for the RP sections. Students were instructed to specify the academic register in their prompts to align with disciplinary expectations. *ChatGPT* was selected based on its prominence in the current AI landscape; according to Rattner and Seetharaman (2024), it is the most widely used generative AI tool among users, making it particularly relevant for academic contexts. Additionally, the AI writing assistant *Writefull for Word* was used to refine grammar, style, and coherence in academic English. *Writefull* was chosen because the Universidad Politécnica de Madrid offers institutional access free of charge to both students and faculty through a licencing agreement, thereby ensuring equitable availability. Beyond convenience, what made the tool particularly useful in this context was its focus on academic discourse. It provides immediate feedback on issues such as grammar, vocabulary, and sentence clarity, drawing on a large corpus of scientific texts to guide students' revisions (Burkhard et al., 2022; Voevoda, 2024).

Prior to using AI tools, students participated in a structured training session on responsible and critical use of generative AI (summarised in Appendix A). This training covered key risks such as bias, factual hallucinations, and citation inaccuracies, and provided best practices for critical verification and ethical integration of AI-generated content. Additionally, students received explicit instruction on prompt engineering techniques designed to elicit high-quality academic outputs from *ChatGPT* (summarised in Appendix B). These preparatory activities aimed to ensure that students could critically engage with AI tools rather than use them passively. The activities of this investigation were structured according to a sequential procedure designed to guide the students through the process of developing a research proposal (RP) using AI tools critically and reflectively. The process began with a teaching phase in which students received a comprehensive lecture on the structure and content of a standard RP document. The course follows a specific format for the research proposal (RP), which begins with a title and subtitle. This is followed by seven main sections: Introduction (background and motivation), Innovation (what makes the solution unique), Description (architecture of the proposed solution), Anticipated Impact (target group who will benefit), Path Forward (implementation steps), and References (works cited in the RP).

Once familiar with the structure, students were instructed to draft the first two RP sections using *ChatGPT*. To demonstrate their understanding of each section, they were required to write prompts that reflect the specific content expectations discussed in class. For example, a group could input: *"Generate an introduction for an RP document on this topic that includes opening context, current practices, and research gaps."* They were expected to use an appropriate prompt that follows the guidelines explained in class (see Appendix B) and screenshot the process. However, overly general prompts that did not reflect a clear understanding of the rhetorical structure discussed in class, such as the expected academic moves and disciplinary conventions, were not accepted. Students were expected not only to generate content but also to operationalise their learning by formulating precise, informed prompts, a key aspect of self-regulated learning. This requirement was central to the activity's pedagogical purpose, ensuring that students actively recalled the structural components taught in the lectures and applied them meaningfully in their AI-generated writing.

Importantly, students were not asked to generate the entire research proposal using generative AI. Instead, the decision to focus on only two sections was deliberate. This enabled students to deeply engage with the affordances and limitations of AI-generated content without becoming overly dependent on it. This approach underscored the principle that AI is a tool for support, not a substitute for critical thinking and academic writing. Students were expected not only to generate content but also to operationalise their learning by formulating precise, informed prompts, a key aspect of self-regulated learning. Following the initial generation, the students engaged in a revision phase, during which they modified the AI-generated content to align with the academic writing conventions introduced earlier in the course. These included aspects such as tone (formal versus informal), hedging, paragraph structure, cohesion, and coherence. For this purpose, the students used the AI writing assistant tool *Writefull* to further refine their texts. They were expected to document both the modifications made and the justifications for each change, again supported by screenshots. The revision phase was aligned with SRL, as students actively monitored their

progress, analysed their AI-generated drafts, and applied self-regulation strategies to improve the quality of their work.

A subsequent reflection phase required students to critically engage with the AI tools' suggestions. They were asked to consider whether or not to apply specific edits proposed by *Writefull*, justifying their choices, and capturing the decision-making process with screenshots. Additionally, students were instructed to evaluate the text citations and references generated by *ChatGPT*, assess their accuracy and credibility, and make necessary adjustments as appropriate. Documentation of this verification process was also mandatory. This process was designed not only to improve the quality of their writing, but also to reinforce their ability to recall and apply the writing principles taught in class, ensuring that learning was transferred from theoretical instruction to practical execution. Here, CDP supports critical engagement with AI output, encouraging them to question and verify information, which fosters higher levels of digital literacy and ethical use of AI. To consolidate the learning experience, students were then required to produce an analytical report reflecting on their interaction with AI tools throughout the assignment. This report served to justify the changes made to the AI-generated content, drawing on writing principles covered in previous sessions. Screenshots of AI suggestions and manual revisions were used to support their critical analysis. This reflective task enhances self-regulated learning, as students must evaluate their own learning process, set improvement goals, and demonstrate the ability to self-monitor and self-evaluate their work.

Finally, after completing all the revisions and reflective tasks, the students submitted the final version of their RP sections through the institutional Moodle platform. This submission was expected to meet academic standards like clarity, coherence, and originality, and was part of the formative assessment. Our methodology, including the use of AI tools, was designed not only to simulate real-world writing support systems, but also to promote conscious engagement with content, thereby improving retention and developing the academic writing competence. By participating in these structured activities, students develop critical literacy in AI-assisted writing, enhancing their ability to produce high-quality academic and professional texts while fostering a reflective approach to language learning and technological integration that aligns with Bloom's revised taxonomy, as demonstrated in the figure below.

Figure 1

Bloom's taxonomy in AI-Assisted Writing

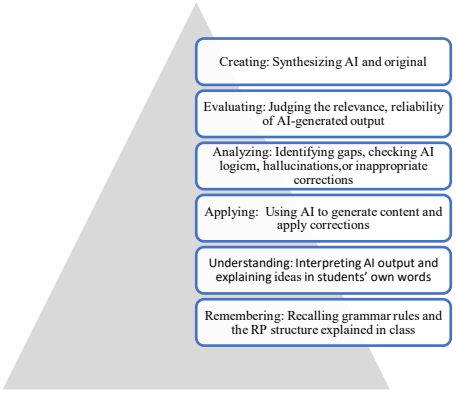

Figure 1 illustrates the integration of Bloom's revised taxonomy within AI-assisted writing practices, specifically in the context of using AI tools such as *ChatGPT* and *Writefull* to support students' development of research proposals. The visual representation follows a hierarchical structure from lower-order to higher-order thinking skills, demonstrating how each cognitive level is activated through a specific interaction with generative AI. At the foundational level, *remembering* involves recalling grammar rules, the structure of the research proposal (RP), and key concepts of each section of the RP, which students can reinforce through generating their own prompts to interact with AI and reflecting on AI-generated content. *Understanding* is engaged when students paraphrase or interpret AI suggestions to grasp the meaning more deeply. *Applying* is evident when learners use AI tools to produce drafts and implement corrections. As students advance, *analysing* includes critically examining AI-generated content for logical coherence and identifying potential hallucinations or inconsistencies. *Evaluating* reflects students' ability to assess the relevance and credibility of AI output in relation to academic standards. Finally, at the highest level, *creating* involves synthesising AI-assisted input with original ideas to construct coherent, academically sound proposals.

This model not only scaffolds cognitive engagement across Bloom's revised taxonomy, but also aligns with critical digital pedagogy by promoting critical awareness of the role and influence of AI tools in academic writing. Students are encouraged to question the assumptions, biases, and limitations embedded in AI-generated content, thereby engaging in higher-order thinking such as *analysing*, *evaluating*, and *creating* with a critical sense. Additionally, it supports the principles of self-regulated learning, since learners actively set goals, monitor their progress, and reflect on the quality and usefulness of AI output in shaping their work. This metacognitive engagement reinforces autonomy and responsibility in the learning process, facilitating deeper interaction with each cognitive level of the taxonomy. Together, these frameworks contribute to a pedagogical approach in which generative AI becomes a medium for reflective, critical, and self-directed academic writing.

Data Collection

Qualitative data were collected from 96 undergraduate students (in 24 project groups) enrolled in the EPAC course through analytical reports submitted along with their research proposal (RP) sections. These 24 reflective reports, each 2 pages long, were a mandatory component of the RP assignment and were guided by an assessment rubric available on the institutional *Moodle* platform (see Appendix C). Students were instructed to reflect critically on their interactions with AI tools, specifically ChatGPT and Writefull, throughout the drafting and refining of their RP.

Data Analysis

Data analysis followed an inductive thematic analysis approach (Braun & Clarke, 2006) informed by grounded theory coding procedures (Corbin & Strauss, 2008), allowing patterns and categories to emerge from students' reflective reports rather than relying on predefined codes. All reflective reports were read several times to become familiar with the data and identify recurring ideas related to students' experiences with AI tools in the academic writing process.

During the initial open coding phase, text segments were assigned descriptive labels that captured key ideas and perceptions. Examples of initial codes included *idea generation*, *identifying research gaps*, *contextualised prompting*, *grammar correction*, *improving academic tone*, *verifying AI outputs, and critically evaluating suggestions*. These codes were grounded directly in students' written reflections and were iteratively refined throughout the analysis.

In the second stage, related codes were grouped into broader analytical categories through axial coding (see Appendix C for the full coding tree derived from students' reflective reports). These categories captured recurring functions of the AI tools as reported by students, such as supporting literature review processes, identifying domain-specific problems, enhancing linguistic accuracy, and promoting critical engagement with AI-generated content. The categories and representative excerpts are presented in Tables 1 and 2, which illustrate how students described their use of ChatGPT and Writefull and how they critically interacted with the tools.

Through constant comparison across reports and analytical discussions between the researchers, the categories were further synthesised into two overarching themes: (1) ChatGPT as a generative and reflective writing companion, and (2) Writefull as a tool for linguistic accuracy and academic tone. These themes emerged from the functional roles the tools played in students' writing processes and were interpreted in relation to the pedagogical design of the course, which aimed to integrate AI tools as complementary supports for higher-order (idea development, reflection, problem identification) and lower-order (language accuracy, style, and coherence) aspects of academic writing. The interpretation of these themes was guided by the study's theoretical framework, particularly in examining how students' interactions with AI tools reflected processes of critical engagement (CDP), metacognitive regulation (SRL), and progression across levels of cognitive complexity as described in Bloom's revised taxonomy. To enhance analytic rigour and credibility, intercoder reliability was assessed by having a second coder independently analyse a randomly selected 20% sample of the reports. This approach is commonly used in qualitative exploratory studies to ensure consistency in the application of codes (Miles et al., 2014). Discrepancies were discussed until consensus was reached, and the coding scheme was refined accordingly.

To complement human coding and enhance consistency, AI-assisted tools were employed to cross-check the emerging codes and categories. Using iterative, prompt-guided analyses with ChatGPT, students' reflective reports were reviewed to identify recurring patterns and assess alignment with the manually assigned codes. Any discrepancies or suggestions from the AI were examined collaboratively by the researchers, leading to refinements in code definitions and category boundaries where appropriate. This AI-supported validation provided an additional layer of verification, reinforcing the credibility of the final themes and ensuring that all coding decisions were systematically documented and justified. Notably, AI outputs were used solely as an analytic support tool rather than as an independent coding mechanism, and final coding decisions remained the responsibility of the researchers.

Researcher reflexivity was also considered during the analysis process through conducting regular discussions to critically examine interpretations and minimise potential bias. Analytical

decisions were documented throughout the process to ensure transparency and trustworthiness in theme development.

Results

ChatGPT: A Generative and Reflective Writing Companion

Students viewed *ChatGPT* as a useful cognitive companion to overcome the first obstacles to writing. It has been used, as indicated in the instructions and the rubric of the activity (see Appendix C) to design sections such as introduction and background, and to identify potential research gaps. More importantly, the students did not use *ChatGPT* passively. They reported on the critical refinement of the prompts, the rephrasing of the vague outputs, and the use of tools to stimulate reflection and discussion. A common concern was *ChatGPT's* hallucinations, which led to the initial validation of sources by students. The need to verify and adapt AI-generated content ultimately strengthened students' critical thinking and assessment skills. The integration of *ChatGPT* into the writing process significantly deepened awareness of course content and research practices. Across multiple group reports, learners demonstrated metacognitive engagement and critical reflection, moving beyond surface-level text production to a more profound interaction with academic material. The following table illustrates the range and depth of this engagement through a thematic analysis of students' reflections on the use of *ChaGPT* during the research proposal writing process.

Table 1 summarises the main functions, perceived benefits, and critical reflections on the use of ChatGPT. It also provides empirical grounding for understanding how learners navigated the opportunities and limitations of AI-assisted writing in a higher education context. Taken together, these examples confirm that students were not passive recipients of AI support but active participants in reshaping, interrogating, and integrating digital outputs into a meaningful academic work. Their engagement with AI, prompting, verifying, rewriting, and aligning with course content, strengthened both technical writing skills and critical thinking. This reinforces the pedagogical value of integrating generative AI tools within a structured and reflective learning environment.

Table 1

Coding Categories and Students' Reflections on the Use of ChatGPT in Writing

Function	Student Use & Perceived Benefits	Evidence of Critical Engagement (with Direct Quotes)
Emphasis on human expertise and validation	AI provided initial ideas but required substantial revision and fact-checking.	*"This adaptation process emphasised the importance of human expertise and the need for independent research to validate and substantiate the generated content."*
Contextualised prompting to personalise outputs	AI was prompted to reflect project-specific realities such as student schedules and preferences.	*"We guided ChatGPT to envision a solution that incorporates class schedules, extracurricular activities, and individual preferences."*
Identifying and solving domain-specific problems	Helped identify specific gaps and tailor solutions within students' research domains.	*"With these two questions we managed to find the gaps that currently exist and our application can solve."*
Recognising and addressing existing practices	Enabled mapping of real-world limitations to new solutions.	*"ChatGPT was useful in finding the gaps that exist in current practices and how our solution could fill them."*
Using AI to support literature review processes	Used to draft initial literature reviews, identify trends, and detect gaps.	*"We used ChatGPT to conduct a preliminary review of related studies, summarising key findings, and identifying research gaps."*
Verifying and filtering AI-generated content using Critical thinking	Students actively verified sources and content accuracy.	*"it is essential to note that the critical thinking component lies in the human interpretation of the information provided. As users, we played a crucial role in checking and rewriting the input and guiding the AI's thought process, ensuring that the generated content aligns with our goals."*

Writefull: A Precision Tool for Linguistic Accuracy and Academic Tone

Writefull received great recognition for grammar corrections, vocabulary improvements and formal tone corrections. Students reported that the tool improved clarity and fluency in writing, allowing them to internalise academic language practices. However, there have occasionally been complaints about inconsistent stylistic suggestions, particularly with regard to British and American English. Furthermore, some felt that the recommendations of *Writefull* were useful, but sometimes risked overwriting or failed to address deeper structural problems. However, it has served as an effective language teacher and increased the confidence of students in their academic writing.

The findings of this study agree closely with key challenges documented in second language (L2) writing research, particularly regarding linguistic scaffolding, cognitive load management, and language-related anxiety (McGraw-Hill, 2023). Students reported that AI tools like *Writefull* alleviated linguistic insecurity by offering immediate grammatical and stylistic corrections, thus functioning as a form of dynamic scaffolding. However, the tool was consistently approached with a critical lens. Students not only recognised the productivity gains but also actively questioned

the validity and suitability of AI-generated suggestions, thus maintaining ownership over their academic work. These insights are further illustrated in *Table 2* below, which presents students' reflections highlighting both the perceived advantages and the critical engagement strategies they adopted when using *Writefull*.

Table 2

Coding Categories and Students' Reflections on the Use of Writefull in Writing

Function	Student Use & Perceived Benefits	Evidence of Critical Engagement (with Direct Quotes)
Grammar and syntax refinement with critical judgment	Offered spelling, grammar, and expression enhancements.	*"Writefull helped us with checking and improving the first sections… by correcting spelling and grammar mistakes… and suggesting more professional sounding alternative expressions."*
Style and coherence enhancement	Supported consistency in academic tone and semantic precision.	*"It is capable of correcting errors, not only syntactical but also semantic… and it has greatly helped us improve the document's quality."*
Selective integration of AI suggestions	Students evaluated and sometimes rejected recommendations to preserve intended meaning.	*"Some recommendations, such as replacing 'impact' with 'effect,' were carefully examined and discarded to maintain the original meaning."*
Enhancing consistency and academic tone	Helped align register, formality, and coherence across sections.	*"Writefull provided suggestions to enhance the formality and coherence of the text… [and] offered more academic expressions."*
Avoiding over-reliance and promoting critical use	Students reflected on the limitations of automated editing and emphasised the role of human agency.	*"We rejected some suggestions because they changed the tone or used British spelling inconsistently."*

From the table above, we can conclude that *Writefull* was seen as a valuable linguistic editor, praised for its capacity to enhance clarity, coherence, and lexical precision. However, students also demonstrated selective engagement with its feedback, rejecting suggestions that compromised tone or semantic intent. These reflections suggest that rather than relying uncritically on AI, students positioned themselves as active editors and evaluators, reinforcing the pedagogical value of AI tools when situated within a framework of academic agency and critical digital literacy.

Discussion

The findings of this study demonstrate that integrating generative AI into academic writing activities can foster critical thinking, reflective practice, and self-regulated learning. Drawing on instructors' observations and students' analytical reports, the intervention provided practical experience in evaluating AI outputs against established academic writing principles, bridging the gap between explicit instruction and autonomous practice. This aligns with prior research in higher education, which shows that structured writing interventions support both cognitive and metacognitive development (Castillo, 2025; European University Association, 2023; Torrado & Díaz, 2025; UNESCO, 2023), and extends these findings to the context of AI-assisted writing.

Students' engagement with AI-generated content enhanced their understanding of linguistic structures, academic conventions, and ethical considerations in academic writing. Through iterative analysis and refinement using AI writing assistants, students developed greater awareness of key features of academic discourse, including hedging, coherence, cohesion, paragraph structure, and proper citation. This outcome resonates with studies on scaffolded learning activities, which emphasise the importance of structured guidance to promote the transfer of writing skills from classroom instruction to independent practice (Pryma et al., 2025; Rahim & Gregory, 2025). The requirement for students to articulate and share their prompts promoted intentional, goal-oriented use of AI tools. Students learnt to design precise prompts that reflected the structure and content expectations of the research proposal, reinforcing their understanding of the human agency necessary to guide AI outputs effectively. This finding supports recent studies on prompt engineering in higher education, which highlight how careful prompting encourages critical engagement and preserves student ownership of learning (Federiakin et al., 2024; Preschern et al., 2025). Classroom discussions further confirmed that students valued the opportunity to actively apply theoretical concepts from lectures to practical AI-mediated tasks, strengthening both skill retention and understanding of academic writing principles.

Moreover, the structured revision and documentation process encouraged students to critically evaluate AI-generated suggestions rather than accept them uncritically. By comparing automated recommendations with explicit writing guidelines and justifying modifications, students engaged in metacognitive reflection and deepened their awareness of the limitations and affordances of AI tools. This practice aligns with prior research in digital pedagogy emphasising the ethical, reflective, and socially aware use of technology in higher education (Nduna & Ncube, 2025; García-López & Trujillo-Liñán, 2025).Finally, the reflective reporting component enabled students to articulate challenges, learning strategies, and key takeaways, reinforcing the complementary role of human oversight in AI-assisted writing. By completing the activity, students enhanced their ability to evaluate, refine, and critically engage with AI outputs while maintaining academic integrity, supporting the assertion that AI can serve as a tool for intellectual growth rather than a replacement for critical thinking.

Practical Implications

The study offers several practical implications for higher education teaching and learning. First, it demonstrates that structured integration of AI tools into writing activities, combined with explicit instruction and guided support, can enhance students' writing skills while fostering critical

engagement and ethical awareness. Incorporating AI into classroom activities encourages students to take an active role in their learning, particularly through the development of prompt engineering skills, which guide AI outputs to align with academic and professional standards. The intervention also highlights the flexibility of AI support, as generative AI and AI writing assistants can be effectively used in both online and face-to-face learning contexts. Finally, the requirement for students to document revisions and reflect on AI-generated content provides a clear framework for formative assessment, ensuring that AI serves as a complement to instructor guidance rather than a replacement for it. These findings suggest that thoughtful, structured use of AI can improve not only technical writing competence but also students' ability to critically evaluate and regulate their own learning processes.

Theoretical Implications

This study contributes to the theoretical understanding of AI integration in academic writing by illustrating the relevance of several educational frameworks. Critical Digital Pedagogy (CDP) provides a lens through which AI tools can be used to promote ethical, reflective, and socially aware engagement with technology, emphasising student agency and critical consciousness. The intervention also underscores the importance of Self-Regulated Learning (SRL), as students set goals, monitor their progress, and evaluate the quality of AI-generated outputs, thereby developing higher-order cognitive and metacognitive skills. Additionally, the application of Bloom's Revised Taxonomy to AI-mediated writing activities demonstrates how structured tasks can support cognitive development from lower-order skills such as remembering and understanding to higher-order processes such as analysing, evaluating, and creating. By situating AI-supported writing within these frameworks, the study shows that AI can enhance learning outcomes without undermining student autonomy or critical engagement, providing both practical and conceptual guidance for future research and pedagogy in higher education.

Conclusions

Students' reflections on the activities recognised the depth of learning it facilitated. They expressed a deeper understanding of how AI-generated content can be used effectively, and stressed the importance of actively engaging in it rather than passively accepting it. Through the process of producing, analysing, and revising AI-generated texts, students have realised that AI is an instrument that requires human supervision to ensure accuracy, appropriateness, and compliance with academic and professional practices. Many students noted that they developed a more critical and analytical approach to writing and refined their ability to assess the structure, tone, and coherence of their content. Through the activities presented in this paper, students discovered that not all AI-generated references and in-text citations are reliable. Initially, many students assumed that AI-generated citations were accurate, but upon verification, they identified discrepancies and fabricated references. This experience highlighted the importance of cross-checking sources and verifying the authenticity of references, a practice vital to rigorous academic work.

This study demonstrates that AI tools, when thoughtfully integrated into writing instruction, can facilitate critical thinking, metacognitive awareness, and ethical reflection in higher education. By

aligning pedagogical practices with Bloom's revised taxonomy, self-regulated learning, and critical digital pedagogy, the intervention encouraged students to move beyond superficial use of AI and toward deeper, more responsible engagement. Students were not only able to apply academic writing principles but also to interrogate the nature of AI-generated content and its implications for authorship, accountability, and learning.

It is important not to view artificial intelligence as a threat, but rather as a tool that can be adapted to meet our instructional objectives and the evolving needs of our students (European University Association, 2023; UNESCO, 2023). However, although structured integration promotes critical engagement, certain risks persist. Students may still gravitate toward using AI for superficial improvements, potentially limiting the development of greater cognitive and linguistic skills. To address this challenge, we must move beyond passive AI assistance and design AI-driven tools that actively encourage critical thinking. An effective approach is to develop systems that prompt students to reflect through targeted questioning before offering suggestions, ensuring that learners engage thoughtfully with the content rather than relying on AI to generate ideas automatically. This reflective interaction fosters intellectual growth, autonomy, and higher-order thinking skills. This approach aligns with a survey by McGraw-Hill (2023) reporting that 85 percent of undergraduate students would feel more confident using AI tools if they were developed and vetted by trusted academic sources.

A key example of such a tool is a customised, instruction-tuned version of *ChatGPT*, often referred to as a custom AI assistant. This tool can be configured to align with specific course requirements and tailored to support the diverse learning needs of individual students. Once developed, these assistants can be easily shared with students via a dedicated link, ensuring consistent access to AI support aligned with the course's pedagogical goals and learning outcomes. Despite these contributions, there are some limitations to be acknowledged. The study was conducted in a specific course with a relatively small group of students, which could limit the generalisation of the results to other contexts. The analysis was also based on students'reflection reports and captured perceived learning experiences rather than measurable changes in writing performance or long-term results. Therefore, the findings should be considered exploratory and contextual. Future research may investigate similar interventions in several courses or institutions, including larger and more diverse samples, and use a longitudinal approach to better understand the educational impact of AI tools in academic writing.

Acknowledgements

The authors disclose no actual or perceived conflicts of interest. The research was conducted at the Universidad Politécnica de Madrid within the project Innovación Educativa a través de la Inteligencia Artificial: Creación de Contenido Audiovisual para un Aprendizaje Activo y Personalizado (AILEARN), *IE 25.1006*, and as part of the research conducted by the Educational Innovation Group (DIGITAL LEARNING). This study has been partially carried out in the framework of the research project, Análisis del Uso de las Alfabetizaciones Disciplinares Plurilingües en Inglés a través del Análisis de Corpus de Textos Escritos por Estudiantes de Educación Primaria y Secundaria en España (ADAICLE) (PP-2024-10) (Co-PIs: Patricia Bárcena Toyos y Sidoní López Pérez), Universidad Internacional de La Rioja. The authors confirm that they adhere to the ethical standards described in this article and that they have not used artificial

intelligence in the ideation, design, or write-up of this research as per Crawford et al. (2023). The authors confirm that they have met the ethical standards expected as per Purvis and Crawford (2024). **Benali Taouis:** Conceptualisation, Methodology, Investigation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing, Supervision, Project Administration. **Díaz García:** Investigation, Writing – Review & Editing.

References

Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Longman.

Bhuttah, T. M., Xusheng, Q., Abid, M. N., & Sharma, S. (2024). Enhancing student critical thinking and learning outcomes through innovative pedagogical approaches in higher education: The mediating role of inclusive leadership. *Scientific Reports*, *14*, 24362. https://doi.org/10.1038/s41598-024-75379-0

Burkhard, M., Seufert, S., Panjaburee, P., Pichitpornchai, C., & Niklaus, C. (2022). Micro- and macro-level features of NLP-based writing tools in higher education. In S. Iyer et al. (Eds.), *Proceedings of the 30th International Conference on Computers in Education* (pp. 50–55). Asia-Pacific Society for Computers in Education.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3(2)*, 77–101. https://doi.org/10.1191/1478088706qp063oa

Chen, X., Zou, D., Xie, H., & Cheng, G. (2021). Twenty years of personalized language learning: Topic modeling and knowledge mapping. *Educational Technology & Society*, *24(1)*, 205–222. https://drive.google.com/file/d/1aPlfrNYxyPkZeohTg9PvDrWFNFhYR-sf/view

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). SAGE Publications.

Crawford, J., Cowling, M., Ashton-Hay, S., Kelder, J. A., Middleton, R., & Wilson, G. S. (2023). Artificial intelligence and authorship editor policy: ChatGPT, Bard Bing AI, and beyond. *Journal of University Teaching and Learning Practice,* 20(5). https://doi.org/10.53761/1.20.5.01

Castillo, C. (2025, July 8–10). ¿IA sí o IA no? Desafíos y oportunidades en la capacidad creativa de los futuros docentes [Plenary session]. *XXXII Congreso Internacional de Aprendizaje: Human learning and machine learning. Challenges and opportunities for artificial intelligence in education*, Granada, Spain.

European University Association. (2023). *Artificial intelligence tools and their responsible use in higher education learning and teaching.* https://www.eua.eu/publications/positions/artificial-intelligence-tools-and-their-responsible-use-in-higher-education-learning-and-teaching.html

Federiakin, D., Molerov, D., Zlatkin-Troitschanskaia, O., & Maur, A. (2024). Prompt engineering as a new 21st-century skill. *Frontiers in Education*, *9*. https://doi.org/10.3389/feduc.2024.1366434

Freire, P. (1970). *Pedagogy of the oppressed*, London, Penguin.

García-López, I. M., & Trujillo-Liñán, L. (2025). Ethical and regulatory challenges of generative AI in education: A systematic review. *Frontiers in Education, 10,* 1565938. https://doi.org/10.3389/feduc.2025.1565938

Gonye, J., & Moyo, N. (2023). Critical digital pedagogy and indigenous knowledges: Harnessing technologies for decoloniality in higher education institutions of the Global South. In S. Köseoğlu, G. Veletsianos, & C. Rowell (Eds.), *Critical digital pedagogy in higher education* (pp. 133–150). Athabasca University Press. https://doi.org/10.15215/aupress/9781778290015.009

Holmes, N. G., Kumar, D., & Bonn, D. A. (2017). Toolboxes and handing students a hammer: The effects of cueing and instruction on getting students to think critically. *Physical Review*

Physics Education Research, 13(1), 010116. https://doi.org/10.1103/PhysRevPhysEducRes.13.010116

Leibovitch, Y. M., Beencke, A., Ellerton, P. J., McBrien, C., Robinson-Taylor, C.-L., & Brown, D. J. (2025). Teachers' (evolving) beliefs about critical thinking education during professional learning: A multi-case study. *Thinking Skills and Creativity*, *56*, 101725. https://doi.org/10.1016/j.tsc.2024.101725

Leontyev, A. N. (1978). Activity, consciousness, and personality. Prentice-Hall. https://www.marxists.org/archive/leontev/works/activity-consciousness.pdf

Light, L. L., Panicker, S., Abrams, L., & Huh-Yoo, J. (2024). Ethical challenges in the use of digital technologies in psychological science: Introduction to the special issue. *American Psychologist*, *79(1)*, 1–8. https://doi.org/10.1037/amp0001286

McGraw-Hill Education. (2023). *McGraw-Hill study trends report: Instructors and students on study habits, mental health, and more* (Survey conducted by Morning Consult, July 18–August 11, 2023). McGraw-Hill Education. https://www.mheducation.com/about-us/news-insights/blog/mcgraw-hill-study-trends-report.htm

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014)**.** *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.

Nduna, N., & Ncube, A. (2025). Critical digital pedagogy for contemporary transformative practices in the Global South: A literature review. *International Journal of Education and Development using Information and Communication Technology, 12 (1)*. https://doi.org/10.1080/2331186X.2025.2523133

Perkins, M., Furze, L., Roe, J., & MacVaugh, J. (2023). The AI assessment scale (AIAS): A framework for ethical integration of generative AI in educational assessment. *Journal of University Teaching and Learning Practice, 20(6)*. https://doi.org/10.53761/q3azde36

Pintrich, P. R. (2000). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. *Journal of Educational Psychology*, *92(3)*, 544. https://doi.org/10.1037//0022-0663.92.3.544

Preschern, J., Hunter, M., Born-Lechleitner, I., & Kobylak, C. (2025). Developing prompt engineering as a 21st-century skill: The impact of structured ChatGPT instruction in EFL education. *GILE Journal of Skills Development*, *5(3)*, 87–108. https://doi.org/10.52398/gjsd.2025.v5.i3.pp87-108

Pryma, V., Pelivan, O., Teletska, T., Tsobenko, O., & Zagrebelna, N. (2025). AI writing assistants and student competence: A linguistic aspect. *Arab World English Journal, Special Issue on Artificial Intelligence*, 319–329. https://doi.org/10.24093/awej/AI.18

Purvis, A.J. & Crawford, J. (2024). Ethical standards in educational research and publication. *Journal of University Teaching and Learning Practice, 21(9)*. https://doi.org/10.53761/hqnqr710

Purvis A.J. Nicholas, V., & Tai, J. (2024). What's your problem? Writing effective research questions for quality publications. *Journal of University Teaching and Learning Practice. 21(10)*. https://doi.org/10.53761/j64xa573

Rahim, S. A., & Gregory, N. A. (2025). AI writing tools as catalysts for L2 writing development: A quantitative investigation of students' experiences. *International Journal of Academic Research in Business and Social Sciences*, *15(9)*, 350–364. http://dx.doi.org/10.6007/IJARBSS/v15-i9/26490

Selwyn, N. (2019). *Should robots replace teachers? AI and the future of education* (1st ed.)

Polity Press.

Schunk, D.H., & Zimmerman, B. J. (Eds.). (2011). *Handbook of self-regulation of learning and performance* (1st ed.). Routledge. https://doi.org/10.4324/9780203839010

Torrado Cespón, M., & Díaz Lage, J. M. (2025). Enhancing EFL writing skills through technology: An evaluation of EPSS Multimedia Lab and CleverCookie. *Foro de Educación, 23*(1), 29–42. https://doi.org/10.14201/fde.23102

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2023). *Guidance for generative AI in education and research*. UNESCO. https://doi.org/10.54675/EWZM9535

Valls-Carol, R., Rodrigues de Mello, R., Rodrıguez-Oramas, A., Khalfaoui, A., Roca-Campos, E., Guo, M., & Redondo, G. (2022). The critical pedagogy that transforms the reality. *International Journal of Sociology of Education*, *11(1)*, 58–71. https://doi.org/10.17583/rise.8900

Voevoda, E. (2024). Application of artificial intelligence technologies in language training of international relations students: Opportunities and problems. *SSRN*. https://doi.org/10.2139/ssrn.5068070

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, *41(2)*, 64–70. https://doi.org/10.1207/s15430421tip4102_2

Appendix A. Summary of Responsible AI Use Training

As part of their preparation for integrating generative AI tools into academic work, students participated in a structured training session aimed at fostering critical awareness and responsible usage. The training was divided into three main modules:

Understanding AI Risks and Limitations
Students were introduced to key challenges inherent in generative AI systems, including:

- **Bias and Stereotyping**: How training data can lead to biased outputs and the importance of recognising potentially harmful content:
    - AI models reflect the data they are trained on—which may include biased or stereotypical representations.
    - Users must be critical of AI outputs, especially when they generalise people or professions.
    - Encouraging diversity and equity in how prompts are written and how responses are interpreted is essential in academic and professional contexts.

  This was conducted by sharing examples of AI-generated content in which AI associates a specific characteristic or job with a social group, gender, or religion.

- **Factual Hallucinations**: How AI can produce convincing but inaccurate or entirely fabricated information:
    - AI can hallucinate making up facts or references that sound real but are false.
    - Always fact-check AI output using trusted sources.
    - Citing false information can undermine academic credibility.

Mitigation Strategies and Best Practices
Practical guidance was provided on how to approach AI-generated content critically. This included:

- **Cross-verifying information** with reputable academic sources (databases, peer-reviewed journals, textbooks).
- **Evaluating reference accuracy** by checking citations in academic databases such as Google Scholar, Scopus, or university library catalogs.
- **Recognising limits of AI tools**, emphasising that they do not “know” facts but predict likely sequences of text based on training data.

Ethical and Academic Integrity Guidelines
Students were reminded of institutional policies on academic honesty and were taught how to:

- Use AI as a **supportive tool**, not a replacement for original thought.
- Integrate AI outputs **critically and transparently**, ensuring that final submissions reflect genuine understanding and personal input.

Format and Delivery
The training was delivered through a combination of workshops, interactive discussions, and

hands-on exercises. Case studies were used to illustrate real examples of misleading AI content, and students worked in groups to analyze outputs and practice verification techniques. A follow-up guide and checklist were also provided for ongoing reference.

Follow-Up Guide: Responsible Use of Generative AI Tools

This guide serves as a quick reference to help you apply what you have learned in the workshops and ensure your use of generative AI remains ethical and critical.

Checklist for Using Generative AI in Academic Work

1. Before Using AI Tools:

- [ ] Do I have a clear purpose for using the AI tool (e.g., brainstorming, drafting, summarising)?
- [ ] Am I aware of the tool's limitations and potential biases?

2. While Using AI Tools:

- [ ] Have I reviewed the output critically for signs of bias, hallucinations, or inappropriate content?
- [ ] Am I using the AI's suggestions as a starting point, not a finished product?
- [ ] Did I verify all factual claims with credible academic sources?

3. Checking References:

- [ ] Are the references provided by the AI real and verifiable?
- [ ] Have I used tools like Google Scholar or my university library to cross-check citations?

4. After Generating Content:

- [ ] Have I rewritten or restructured AI-generated content in my own words?
- [ ] Is the final version a reflection of my understanding and voice?
- [ ] Am I complying with institutional guidelines on academic integrity?

5. Transparency and Ethical Use:

- [ ] Have I acknowledged AI assistance where required or appropriate?
- [ ] Could I explain and defend my work without the AI output?

Reminder: When in doubt, treat AI-generated content with the same critical lens you would apply to an unfamiliar online source.

Appendix B. A training on How to Generate Effective Prompts

Worksheet: How to Write the Perfect Prompt for a Research Proposal Using ChatGPT (GPT-4)

Objective:
Learn to write clear, specific, and academically appropriate prompts to generate high-quality sections of your research proposal using ChatGPT.

PART 1: What Makes a Perfect Prompt?

Element	Explanation	Example
Context	Briefly explain what the proposal is about and its field or purpose.	"This is a research proposal in data science about predictive healthcare systems."
Section Name	Specify what section you want ChatGPT to generate.	"Write the Background and Motivation section…"
Content Elements	Include the structural moves that must appear in the section.	"…including background, current practices, and research gap."
Tone/Register	Ask for a formal academic tone.	"…in formal academic English, suitable for a research proposal."
Formatting Instructions	Specify paragraph length, structure, or citation style if needed.	"Use two well-developed paragraphs and APA citation style."
Disciplinary Focus	Mention the field or audience to tailor disciplinary conventions.	"…for an audience in computer science and engineering."
Purpose of the Section	State what the section should achieve.	"…the Background and Motivation should clearly justify the need for the proposed solution."

PART 2: Examples of Strong vs. Weak Prompts

Good Prompt:

- Write an Introduction section for a research proposal on using blockchain for electronic voting. Use formal academic style. The section should include background information, an overview of current solutions, and the research gap. The audience is IT and cybersecurity professionals. Format it as two paragraphs with APA-style citations.

Weak Prompt:

- Can you write something about voting with blockchain?
- Write the introduction of our research proposal about using blockchain in electronic voting.

PART 3: Use the Prompt Template

"Write a [section name] for a research proposal on [your topic], written in a formal academic style. The section should include [key content elements] and reflect academic conventions in [your discipline]. The audience is [academic/professional group], and the section should be formatted as [e.g., two paragraphs, list, table, chart, APA style]. The purpose is to [clarify motivation / explain innovation / outline impact, etc.]."

PART 4: Build Your Own Prompt

- Your research topic: _____
- Proposal section you want to generate: _____
- Key elements to include in the section (e.g., background, innovation, impact): _____
- Tone/register required (e.g., formal academic): _____
- Disciplinary focus or target audience: _____
- Formatting instructions (if any): _____
- Purpose of the section: _____

Final prompt (combine your answers):

_____

_____

_____

Appendix C. Research Proposal Assessment Rubric

Research Proposal Assessment Rubric

1 = Excellent performance. Exemplary, skilled, marked by excellence across the weighted section (e.g., 40%, 35%, 20%, 5%).

0,75 = Good performance. Competent, effective, accurate and clear, but lacks the exemplary depth, precision, and insight of excellent performance.

0,5 = Average performance. Satisfactory, but lacks accuracy and effectiveness.

0,25 = Below the average performance. Inconsistent, ineffective; shows a lack of consistent competence.

0 = Bad performance. Unskilled and insufficient in this section, failing to meet minimum expectations.

Issue	Description	Score
Sections and content (40%)	Background and Motivation (10%) ● The research territory is clearly established (by showing that the general research area is important, central, interesting, problematic in some way) ● The background of the research (state-of-the-art) provides a critical account of what has been achieved so far (what is the gap? Why are existing solutions not good enough? Are the limitations of current approaches clearly stated?) ● The research problem or research questions are clearly identified, and logically emerge from the background	

	Innovation and Description (10%) ● The main aim of the research is clearly defined ● The way in which the existing gaps are covered by your research idea is stated (competitive advantage) ● The technology that lies behind your proposal is clearly specified (type of technology and how it is going to be applied) ● A description of the research idea from a developer's perspective is provided (design concept, architecture) ● A description of the research idea from a user's perspective is provided (functioning and use) ● Assumptions and limitations of your research idea are clearly stated (real evidence that your proposal is achievable is included)	
	Anticipated Impact and Path Forward (10%) ● The general impact of your solution is specified (and quantified, if possible) ● Potential users of your proposal are clearly stated (and quantified, if possible) ● Risks and payoffs of your solution are described ● Tasks/steps/stages for the implementation of your solution are specified and sequenced ● Implementation time is allocated for each task ● A Gantt chart is included to illustrate the work plan	

	Title, Figures and Tables (10%) ● The title contains all essential keywords of the research and encapsulates the essence of the paper ● Figures and tables are elaborated to illustrate the solution and contribute to its understanding (especially in the description section for design concept, architecture, functioning & use, etc.)	
	Organisation and flow of information (coherence & cohesion) (5%) ● All information is located in the appropriate section ● Information is presented in a logical way that is easy to follow ● Ideas are sequenced within paragraphs and there is a smooth transition between paragraphs (inter-and intra-coherence) ● There are no isolated sentences not properly connected with Appropriate use of connectors and connecting devices	

Academic Writing (20%)	Style (5%) ● Formal academic writing is used ● The use of personal pronouns is avoided and passive voice is used when appropriate (impersonal style) ● No contractions, phrasal verbs, or colloquial language are used ● Precise, specialist language is used ● Personal beliefs or emotions are avoided (objective style)	
	Citation and References (5%) ●Plagiarism is avoided ● All information that is not original is properly cited (direct citation or paraphrased) ● A considerable number of authoritative sources of information is used to justify claims (min. 5 sources) ● References are consistently used in the text according to selected style (IEEE citation style)	

Spelling and grammar (5%)	Format and aesthetics (5%) ● The names of the authors and the group number are included on the first page ● All pages are numbered ● Consistent format (no more than 2 font types, main text has the same font size, line spacing is consistent, margins justified) ● Tables and figures are correctly numbered ● Tables and figures are mentioned and discussed in the text ● Sources for tables and figures are included in the reference section according to the citation style ●	
	● There are no spelling mistakes ● A spell checker has been used and a manual double-check has been performed ● Spelling is consistent (no mixture of British and American spelling) ● Correct grammar is used ● Writing assistants have been used to avoid major grammar and style errors	

Analytical Report (ChatGPT and writefull) (35 %)	ChatGPT report (20%) ● The report includes screenshots of interactive communication with ChatGPT. ● The interaction with AI is based on questions that show students´awareness about the RP structure (ideas to include in each section). ● A paragraph of 500 words that explains the process of creating the text with AI (Background and motivation and Innovation) and demonstrates critical thinking about the information generated by AI. ● The report should show double-checking of the content generated by ChatGPT to make sure the information is accurate (references, approaches, methodologies, limitations, etc). Writefull report (15%) ● A paragraph of 500 words that explains the process of editing the text with Writefull (Background and motivation and Innovation). ● It should show the suggested changes, both the accepted and the rejected ones, and explain the reason behind each action by referring to the language rules explained in class. ● In both ChatGPT and Writefull reports there should be a clear reflection about the advantages and disadvantages of the use of these tools in creating and reviewing the 2 first sections of your RP.	

Category	**Maximum Points**	**Score**
Sections and Content	**40**	
Academic Writing	**20**	
Spelling and Grammar	**5**	
Analytical Report (ChatGPT and Writefull)	**35**	
Final Score	**100**	

Notes:

- Each section must be assessed individually according to the adapted performance scale.
- Multiply the assigned score by the maximum points of each section.
- Final scores will reflect the weighted importance of each section in the total research proposal evaluation.

Feedback and Comments:

Appendix D. Coding Tree Derived from Students' Reflective Reports